

CLAIMS

We claim:

1. A computer-aided-educational method for educating a student on a subject through a computer, which includes a presenter and a non-intrusive sensor, the method comprising the steps of:
- presenting study materials on the subject to the student through the presenter;
 - monitoring automatically more than once the student's concentration-sensitive behavior through the sensor while the student is studying the materials;
 - analyzing the monitored results based on one or more rules; and
 - providing an indication on the student's concentration level based on the analysis.
2. A computer-aided-educational method as recited in claim 1 wherein for the step of monitoring, more than one type of the student's concentration-sensitive behavior is monitored.
3. A computer-aided-educational method as recited in claim 1 wherein for the step of monitoring, the behavior monitored is of the same type.
4. A computer-aided-educational method as recited in claim 1 wherein the student's behavior is volitional.
5. A computer-aided-educational method as recited in claim 4 wherein the type of behavior includes the student's volitional inputs.
6. A computer-aided-educational method as recited in claim 5 wherein:
the sensor monitors the speed of the student's inputs; and

3 one rule is that if the speed of the student's volitional inputs across a
4 predetermined period of time is significantly lower than a reference speed, the student has
5 lost concentration in the study materials.

1 7. A computer-aided-educational method as recited in claim 6 wherein whether a
2 decrease in speed is significant or not depends on the difficulty level of the study materials.

1 8. A computer-aided-educational method as recited in claim 5 wherein:
2 the study materials are presented in one or more windows of a multi-window
3 environment;
4 the study materials reside in at least one of those windows; and
5 one rule is that if, for a predetermined amount of time, the student's inputs are not
6 in the one or more windows displaying the study material, the student has lost
7 concentration in the study materials.

1 9. A computer-aided-educational method as recited in claim 5 wherein:
2 the study materials are presented in a window environment with a focus window;
3 and
4 one rule is that if the study materials are not in the focus window for a
5 predetermined amount of time, the student has lost concentration in the study materials.

1 10. A computer-aided-educational method as recited in claim 4 wherein the volitional
2 behavior is based on the student's face.

1 11. A computer-aided-educational method as recited in claim 10 wherein before the
2 step of monitoring, the method comprises the step of calibrating the student's face to
3 generate a reference image.

1 12. A computer-aided-educational method as recited in claim 10 wherein the behavior
2 includes the student's facial orientation.

1 13. A computer-aided-educational method as recited in claim 11 wherein one rule is
2 that if results from two consecutive monitoring of the student's face are different from the
3 reference image, the student has lost concentration in the study materials.

1 14. A computer-aided-educational method as recited in claim 10 wherein the behavior
2 includes the condition of the student's eyes.

1 15. A computer-aided-educational method as recited in claim 10 wherein the behavior
2 includes the student's facial expression.

1 16. A computer-aided-educational method as recited in claim 11 wherein:
2 the sensor includes a camera;
3 the presenter includes a monitor; and
4 the step of calibrating includes asking the student to look at the monitor.

1 17. A computer-aided-educational method as recited in claim 1 wherein the student's
2 behavior monitored is involuntary.

1 18. A computer-aided-educational method as recited in claim 17 wherein the behavior
2 includes the size of the student's pupils.

1 19. A computer-aided-educational method as recited in claim 1 further comprising the
2 step of reacting according to the indication provided.

1 20. A computer-aided-educational method as recited in claim 19 wherein the reaction
2 includes punishing the student for losing concentration in working on the study materials.

1 21. A computer-aided-educational method as recited in claim 19 wherein the reaction
2 includes stimulating the student to re-focus on the study materials if the student has lost
3 concentration in the study materials.

1 22. A computer-aided-educational method as recited in claim 21 wherein if the student
2 has worked on the study materials for a pre-determined amount of time, the reaction
3 includes allowing a student to play a game and then resuming back to the study materials.

1 23. A computer-aided-educational method as recited in claim 19 wherein the reaction
2 includes changing to a different study materials to present to the student.

1 24. A computer-aided-educational method as recited in claim 19 wherein the reaction
2 includes asking the student a question.

1 25. A computer-aided-educational method as recited in claim 24 wherein the study
2 materials to be presented to the student depends on the student's response to the question.

1 26. A computer-aided-educational method as recited in claim 24 wherein the speed of
2 presenting the study materials to the student depends on the student's response to the
3 question.

1 27. A computer-aided-educational method for educating a student on a subject
2 through a computer, which includes a presenter, the method comprising the steps of:
3 presenting study materials on the subject to the student through the presenter;
4 asking by the computer, the student a question, when the student is unlikely to
5 expect a question; and
6 resuming presenting study materials on the subject to the student through the
7 presenter;
8 such that the unexpected nature of the question stimulates the student to enhance
9 the student's concentration level in the study materials.

1 28. A computer-aided-educational method as recited in claim 27 wherein the student's
2 answer to the question does not affect the study materials resumed to be presented to the
3 student.

1 29. A computer-aided-educational method as recited in claim 27 wherein:
2 the student's answer to the question provides an indication on the student's
3 understanding level in the study materials presented; and
4 the difficulty level of the study materials resumed to be presented depends on the
5 indication.

1 30. A computer-aided-educational method as recited in claim 1 wherein for the step of
2 monitoring, between two consecutive monitoring of the student's concentration-sensitive
3 behavior, the method further comprises the step of analyzing the monitored result based
4 on one or more rules.

1 31. A computer-aided-education method as recited in claim 1:
2 further comprising the step of determining a reference for the student; and
3 wherein the step of analyzing includes the step of comparing the student's
4 monitored results with the reference to identify the student's concentration.

1 32. A computer-aided-education method as recited in claim 31 wherein the reference is
2 a dynamic reference, which incorporates monitored results indicating the student has not
3 lost concentration in the study materials.

1 33. A computer-aided-educational method as recited in claim 31 further comprising
2 the steps of:
3 establishing the student's identity; and
4 storing the identity with the reference to be used by the student in the future.

1 34. A computer-aided-educational system for educating a student on a subject
2 comprising:
3 a presenter for presenting study materials on the subject to the student;
4 a non-intrusive sensor for monitoring more than once the student's concentration-
5 sensitive behavior while the student is studying the materials;
6 a controller for analyzing the monitored results based on one or more rules; and
7 an indicator for providing an indication on the student's concentration level based
8 on the analysis.

1 35. A computer-aided-educational system as recited in claim 34 wherein the student's
2 concentration-sensitive behavior is volitional.

1 36. A computer-aided-educational system as recited in claim 34 wherein the student's
2 behavior is involuntary.

1 37. A computer-aided-educational system as recited in claim 34 wherein the system
2 reacts according to the indication provided by the indicator.